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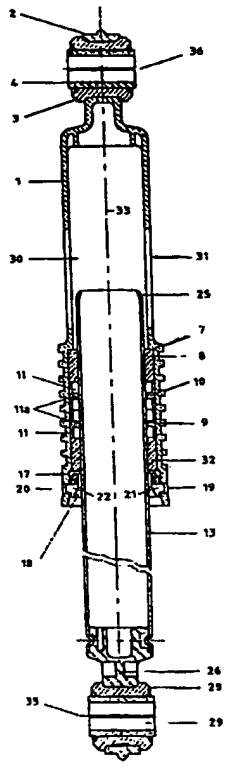
(54) Title: A FRICTION VIBRATION DAMPER

(57) Abstract

In the damper of the invention, consisting of a tubular body (1) and a coaxial piston rod (13) slidably disposed inside the said body (1), a graduation (7) has been formed. In addition to this graduation (7) which causes an enlargement of the body diameter, a second graduation (17) is provided at the lower end of the pipe. Two friction elements (8, 32) are placed between these graduations (7, 17) with defined internals between them. Two oiling rings (segments) (9, 10), placed between the said friction elements (8, 32) provide the reduction of the friction heat generated during the operation of the damper. The generated heat, furthermore, is discharged through two rectangular ventilation openings (30, 31) opened on the tubular body, thus the cooling of the piston rod (13) is facilitated. The oiling rings (9, 10) serve as the oil reservoirs by forming the necessary oil reserve cell (11) between the upper (8) and lower friction elements (32) while at the same time they prevent the friction elements (8, 32) to move towards each other, thus keeping the distance between the said elements, unchanged.



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# A FRICTION VIBRATION DAMPER

The present invention relates particularly to a friction vibration damper used in washing machines provided with a rotating drum.

The friction dampers used in washing machines, in general, are the elements damping out the vibrations which occur due to unbalance at the begining or end of the rotation, or acceleration and/or deceleration of the machine drum, by means of the compression force created by one or two friction elements compressed between two telescopic pipes or similar parts. The referred dampers can be classified in to two groups according to the operating position of the friction element. The first group functions by the friction of the outer surface of a ring-like piece formed by a cellular sponge-like plastic material to the inner surface of a pipe. The second group consists of those dampers wherein the inner surface of the said annular friction ring is in friction with the outer surface of a pipe. In both types of the damper, frictional heat which in turn leads to a reduction in performance by the course of time, occurs.

The object of the present invention is to provide a friction damper of the latter type, which comprises two identical oiling segments used to minimize the frictional heat created by the friction of the inner surface of the friction element to the outer surface of a pipe, and due to the provided heat reduction, which can operate for a long period without any problems, as well as which can be produced less expensively due to the improvements in the manufacturing activities .

In the following description, the friction vibration damper realized in order to attain this object of the invention has been described with reference to the attached drawings, wherein:

Figure 1, is the cross-section view of the friction damper;

Figure 2, is the view of one of the oiling segments as removed from the mould;

Figure 3, is the view showing the two oiling segments side-by-side and ready for mounting;

Figure 4, is the side view of the lock-segment,

Figure 5, is the top view of the lock-segment.

The friction vibration damper consists of a tubular body (1) and a plunger piston rod (13) moving co-axially (33) in and with the said tubular body (1). Two friction elements (8,32) of a sponge-like cellular, plastic material are inserted between the inner surface of the tubular body (1) and the outer surface of the piston rod (13) with a certain distance to each other in such a manner that they move together with the tubular body (1). In the gap between the friction elements, two identical oiling segments (9,10) are placed. The damper of the invention, is connected to the tub and the cabinet of the washing machine by means of the ball-and-socket joints (2,3,4,26,28,29) placed on the respective ends of the inner (13) and outer (1) pipes, with axes (35,36) vertical to the axis of the damper.

The tubular body (1) is made of plastic material and a head bearing (2) is formed on its upper end in order to provide a resilient connection with the washing machine. In the said bearing (2) a rubber or plastic bush (3) which also contains a steel or plastic bush (4), is attached.

The piston rod (13) is made of a steel pipe, one end (25) of which is rounded towards the axis of the pipe (33) to facilitate the assembly. Whereas the other end of which is provided with a plastic cap (26). This plastic cap (26) which is fixed at its placed by shrinking and narrowing this end of the piston rod (13), serves to provide the connection of the pipe to the washing machine cabinet by means of an

elastic connection. Inside the plastic cap (26), an elastic bush (28) is placed with an axis vertical to that of the tubular body (1), which in turn contains a steel or hard plastic bush (29) to provide the suitable connection to the washing machine. The piston rod (13) operate within the friction elements (8,32) while moving slidably to and fro inside the tubular body (1) depending on the vibrations created due to the unbalanced movements of the drum of the washing machine.

An enlargement in the diameter of the body has been provided by means of a graduation (7) (step) formed on the portion towards the middle of the tubular body (1). This graduation (7) prevents the entry of the friction elements (8,32) to the narrowing upper portion of the tubular body. On this portion with a relatively larger diameter, respectively, an upper friction element (8) fitted on its place as a ring, two identical oiling segments (9,10) and a lower friction element (32) which is similar to the upper element (8), are placed sequentially on the inner surface of the lower end of the tubular body (1), and a second graduation (17) is formed. The friction elements (8,32) and two oiling segments (9,10) placed annually around the piston rod (13), starting from the first graduation (7) are locked to be held together on the tubular body (1) by means of a locking segment (18) provided on the second graduation (17). Consequently, all of these elements act as one piece and they cannot move individually. All of these elements move together with the tubular body (1) and on the outer surface of the piston rod (13) inserted through the lower portion of the tubular body (1).

The locking segment (18) made of an elastic and durable elastic and durable plastic material, is placed at the lower end of the tubular body (1) in such a manner that it will apply pressure on the second friction element (32) and this process is achieved by engaging the two claws (21,22) on the locking segment (18) to the holes (19,20) on the tubular body (1). In order to fit the locking segment (18) in its place, two slots (23,24) are formed on the sides of each claw (21,22). By means of extra flexibility provided due to these slots (23,24), the

claws (21,22) can engage to the the holes (19,20) on the tubular body (1) more easily, by this way, the fitting of the locking segment (18) has been facilitated.

The oiling segments (9,10) have been superposed just below the upper friction element (8). These parts are made of a plastic material, by way of plastic injection moulding and acquired in the form of a ring (Fig 2). These two parts (9,10) are placed side by side so that they encored the outer surface of the piston rod (13) (Fig. 3) . Thus the two identical parts form an oiling means. The diameter of the oiling segments (9,10) is provided in appropriate dimensions to be fitted in the tubular body (1).

The oiling segments (9,10) inserted between the friction elements (8,32) comprise projections (11a) to help the retaining of the oil. The said segments (9,10) provide the reduction of the friction heat created during the operation of the damper and its distribution above the metallic piston rod (13), due to the oil contained in the cells (11) formed by these projections (11a). The created heat is also discharged through two rectangular ventilation openings (30,31) on the tubular body (1) and the cooling of the piston rod (13) is thus facilitated. The ventilation openings (30,31), at the same time, prevent the compression of the air in the damper during the vibratory and to-and-fro movements of the piston. The oiling segments (9,10) function as the oil tank by forming the required oil cell (11) space between the upper (8) and lower friction (32) element and they also prevent the approaching movements of the friction elements (8,32) towards each other thus keeping the distance between them unchanged.

When the piston rod (13) is fitted in its place the oiling cells (11) formed between the oiling segments (9,10) and the friction elements (8,32) completely encircle the said pipe. These cells (11) provide the lubrication of the piston rod (13) while operating and also provides the dispersion of the heat generated due to friction, above the pipe. The damper of the invention provides the desired friction force within the permitted tolerance limits, during its service life.

## CLAIMS

1. A friction vibration damper used to dampen out the vibrations generated by the drum of the washing machines, comprising a plastic tubular body (1) and a metallic piston rod (13) supported by two friction elements (8,32) inside the said pipe (1) moving coaxially with the enveloping plastic pipe (1); characterized in that it is connected to the washing machine tub and cabinet, with axes vertical to the damper axis by means of the ball-and-socket joint elements (2,3,4,26,28,29) placed at the outer ends of the inner (13) and outer (1) pipes; and that the friction heat created due to friction is reduced by dispersing the heat above the piston rod (13) by means of the oil provided in the oiling cells (11) formed by the oiling segments (9,10) encircling the piston rod, placed between the two friction elements (8,32) and that the said heat is discharged out through the ventilation openings (30,31)opened on the outer pipe (1).

2. A damper according to claim 1, characterized in that the distance between the upper (8) and the lower friction element (32) is kept constant by means of the oiling segments placed in this space and thus the movement of the said friction elements towards each other is prevented.

3. A damper as claimed in Claims 1 and 2, characterized in that there are two identical oiling segments.

4. A damper as claimed in Claims 1 to 3, characterized in that the said oiling segments comprise projections (11a) serving to retain the oil.

5. A damper according to Claim 4, characterized in that the oiling cells are placed between the said projections (11a) and the friction elements (8,32).

6. A damper according to Claims 1 to 5, characterized in that the oiling segments are placed inside the plastic pipe in the shape of an unclosed ring in such a manner that these segments are between the friction elements.

7. A damper according to Claims 1 to 6, characterized by two graduations (7 and 17) providing an enlargement of the body diameter; first of them being at the middle portion of the tubular body and the second, at the lower end of the same body.

8. A damper according to Claim 7, characterized in that the friction elements and the oiling segments are placed around the piston rod, in such a manner that they are placed between the first and second graduations, and they move together with the tubular body.

9. A damper according to Claims 7 and 8, characterized in that the friction elements and the oiling segments placed around the piston rod, starting from the first graduation, are locked to be held together on the tubular body by means of a locking segment (18) provided on the said second graduation.

10. A damper according to Claim 9, characterized in that the locking segment is fitted on its place at the lower end of the tubular body so that it applies pressure on the second friction element (32) and that this process is realized by engaging the two claw projections (21,22) on the locking segment, to the holes (19,20) on the tubular body.

11. A damper according to Claim 9 and 10, characterized in that the increased resilience of the claws (21,22) during the assembly process is provided by forming two slots (23,24) each on the sides of each claw (21,22), in order to facilitate the fitting of the locking segment (18).

12. A damper according to Claim 1 to 11, characterized in that the ventilation openings are rectangular.

13. A damper according to Claim 1 to 12, characterized in that the end (25) of the piston rod that remains inside the tubular body is rounded towards the pipe axis (33) in order to facilitate the mounting of the piston rod in its place.

FIGURE 1

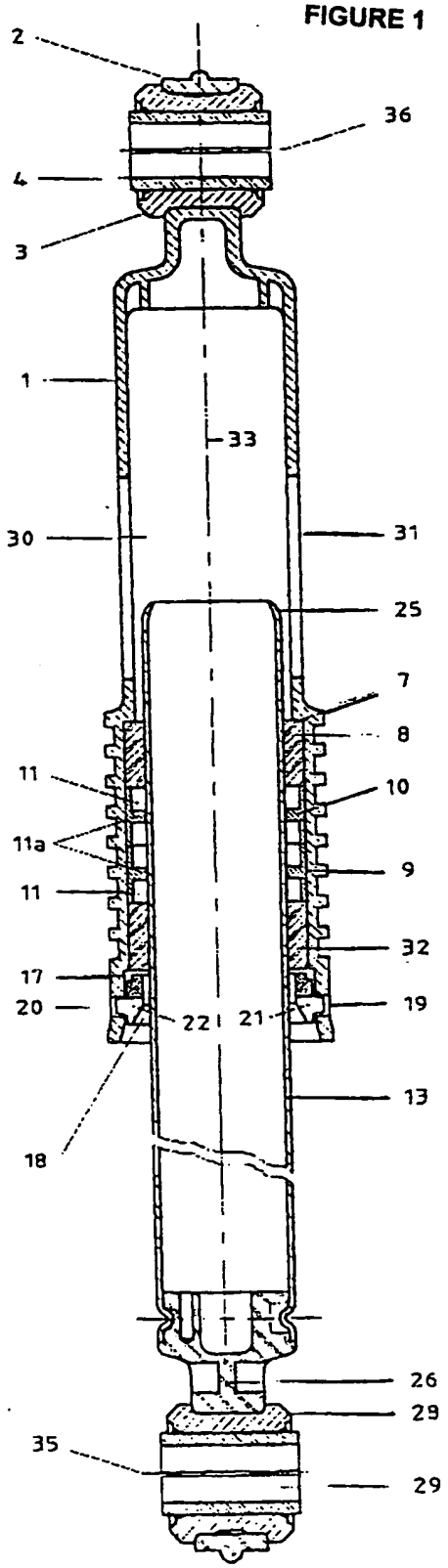


FIGURE 2

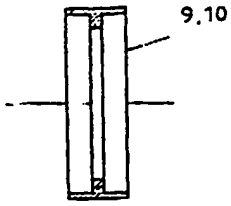


FIGURE 3

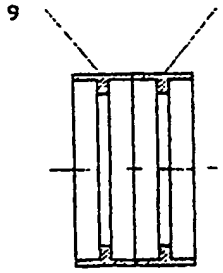


FIGURE 4

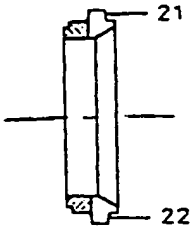


FIGURE 5